AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 20-40 have been renumbered as claims 21-41 as follows:

21. (new) A diode on a silicon substrate, comprising:

an active region in the silicon substrate, the active region being heavily doped with a first type dopant;

a refractory metal silicide layer contacting and covering at least a portion of the active region;

an insulation layer contacting and covering at least a portion of the first refractory metal silicide layer, the insulation layer having a diode opening extending therethrough and communicating with the first refractory metal silicide layer;

a polysilicon plug disposed within the diode opening and contacting the first refractory metal silicide layer, the polysilicon plug comprising:

a bottom portion in contact with the first refractory metal silicide layer and being lightly doped with the first conductivity type dopant, and

a top portion in contact with the bottom portion; and

a material that is capable of changing states and resistivities vertically over and in communication with the polysilicon plug.

22. (new) A diode as defined in claim 22, wherein the material that is capable of changing states and resistivities comprises a programmable resistor, the diode further comprising a metal contact vertically over and in communication with the programmable resistor.

23. (new) A diode as recited in claim 22, wherein the programmable resistor comprises at least one layer comprised of a memory material selected from the group consisting of ovonic and chalcogenide materials.

24. (new) A diode as defined in claim 22, wherein the programmable resistor further comprises at least one barrier layer.

25. (new) A diode as defined in claim 24, wherein said barrier layer comprises titanium nitride.

26. (new) A diode as defined in claim 22, wherein the diode opening has a width in a range between about 0.3 microns to about 0.8 microns.

27. (new) A diode as defined in claim 22, further comprising a continuous second refractory metal silicide layer positioned between the polysilicon plug and the first refractory metal silicide layer and also between the polysilicon plug and the insulation layer.

28. (new) A diode as defined in claim 27, wherein the second refractory metal silicide layer is made of a refractory metal silicide selected from a group consisting of: titanium silicide, tungsten silicide, tantalum silicide, cobalt silicide, and molybdenum silicide.

29. (new) A diode on a silicon substrate, comprising:

a silicon substrate lightly doped with a first conductivity type dopant;

an oxide layer overlaying the silicon substrate, the oxide layer having a top surface and defining a hole which extends through the oxide layer and communicates with a portion of the silicon substrate;

a polysilicon plug positioned within the hole in the oxide layer, the polysilicon plug being doped with a second conductivity type dopant opposite the first conductivity type dopant;

an active region formed in the silicon substrate below the polysilicon plug, the active region being doped with the second conductivity type dopant received from the polysilicon plug; and

a material that is capable of changing states and resistivities vertically over and in communication with the polysilicon plug.

30. (new) A diode as defined in claim 29, wherein the oxide layer defines a channel that extends from the top surface of the oxide layer to the top surface of the polysilicon plug, the polysilicon plug having a top surface that is below the top surface of the oxide layer.

31. (new) A diode as defined in claim 29, wherein the polysilicon plug is at least partially encased by the oxide layer;

32. (new) A diode as defined in claim 29, wherein the material that is capable of changing states and resistivities comprises a programmable resistor, the diode further comprising a metal contact vertically over and in communication with the programmable resistor.

33. (new) A diode as recited in claim 32, wherein the programmable resistor comprises at least one layer comprised of a memory material selected from the group consisting of ovonic and chalcogenide materials.

34. (new) A diode as recited in claim 32, wherein the programmable resistor further comprises at least one barrier layer formed of titanium nitride.

35. (new) A diode on a silicon wafer, comprising:

an active region in a silicon wafer, the active region being heavily doped with a first conductivity type dopant;

a first refractory metal silicide layer contacting and covering at least a portion of the active region;

an insulation layer contacting and covering at least a portion of the first refractory metal silicide layer, the insulation layer having a diode opening defined by an interior surface extending through the insulation layer and communicating with the first refractory metal silicide layer;

a second refractory metal silicide layer lining the interior surface of the diode opening so as to contact the first refractory metal silicide layer;

a polysilicon plug within the diode opening, the polysilicon plug being lightly doped with the first conductivity type dopant;

a platinum silicide layer contacting the polysilicon plug and separated from the second refractory metal silicide layer;

an insulative silicon layer overlying the diode opening, the insulative silicon layer having a passageway extending therethrough and communicating with the platinum silicide layer; and

a layer of a material that is capable of changing states and resistivities material over the insulative silicon layer, within the passageway, and contacting the platinum silicide layer.

36. (new) A diode as defined in claim 35, further comprising:

a metal contact in contact with the material that is capable of changing states and resistivities.

37. (new) A diode as defined in claim 35, wherein the material that is capable of changing states and resistivities comprises a programmable resistor.

38. (new) A diode as recited in claim 37, wherein the programmable resistor comprises at least one layer comprised of a memory material selected from the group consisting of ovonic and chalcogenide materials.

39. (new) A diode as defined in claim 37, wherein the programmable resistor further comprises at least one barrier layer.

40. (new) A diode as defined in claim 39, wherein the barrier layer comprises titanium nitride.

41. (new) A diode as defined in claim 35, wherein the polysilicon plug comprises polysilicon having an average grain size diameter in a range between about 0.3 microns to about 0.8 microns.